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Can the state maintain its dam projects?



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CAN THE STATE MAINTAIN ITS DAM PROJECTS ? ? ?

MAY 1981

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The title to this paper is both literal and figurative. That is, the paper addresses only those state projects that have dams associated with them and it analyzes problems with these projects that present a major liability to the state. But first a little background on state water projects and an explanation of the dam problem.

### HISTORY

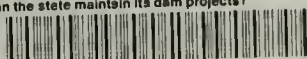
In 1934, the State of Montana initiated a major, formal program of construction and operation of state-owned water development projects intended primarily to provide irrigation water for agriculture. This program was established by legislation passed during a special session of the Montana Legislature in 1933 and subsequently amended and strengthened by the Legislature in 1935. According to a 1961 report prepared by Robert J. Kelly, (longtime Administrative Officer of the State Water Conservation Board) entitled State Water Conservation Board: Summary of Activities from Inception January 22, 1935 to June 30, 1960, a summary of the enabling legislation for this state water program provided:

The Act creating the Board declared its purpose to encourage public works and to reduce unemployment and thereby assist in the national recovery and promote the public welfare. It also declared that the public interest, welfare, convenience and necessity required the construction of a system of works for the conservation, development, storage, distribution and utilization of water. It declared that the Board was performing a governmental function in carrying out the provisions of the act and that water conservation was a state purpose. It specified Board was a body corporate and politic with perpetual existence and an agency of the state of Montana. Broad powers were given



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### HISTORY

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to the Board allowing it to cooperate and enter into agreements with all federal and state agencies, investigate, survey, construct, operate and maintain, and to finance the construction of projects either through funds appropriated to it, by grants or by the sale of water conservation revenue bonds. It established various funds that were necessary in the servicing of the bond issues as the funds required to carry on the business of the Board.

The Board was given authority to file on all unappropriated water of the state and the right of eminent domain to acquire lands needed for projects. Several clauses of the act broaden the powers of the Board to include all types of development of natural resources.

The State Water Conservation Board vigorously established and pursued the program envisioned by the Legislature. There is no question that the program was successful in its construction of significant water works, minimal investment cost, increased direct and indirect employment resulting from the project construction, improved and expanded use of state water resources, and immense economic assistance to agriculture within the state.

In all, 181 water projects of a variety of types and sizes had been constructed by the late 1950's. Included were 141 dams and reservoirs with a total storage capacity of over 438,000 acre-feet. Associated with the dams and reservoirs were numerous diversion structures and 815 miles of canals with the capacity to carry some 260,000 acre-feet of water. Total acreage served by the state projects was in excess of 400,000 acres.

In the late 1950's, the State of Montana apparently lost its momentum in development of its own water resources under direct state sponsorship. This change in emphasis from the vigorous and exciting construction periods of the 1930's and 1940's is suggested in the Kelly report, where it is states, "Primarily the Board is a construction agency but with construction"



activities slowed by limited funds and high costs, the Board has had an opportunity to give more attention to the problems of management of its projects." The Kelly report states, "In continuing the construction of the projects the Board has faced a serious problem because rising construction costs have outdistanced the increase in farm income." Not only was there no new construction of significance after release of the Kelly report, there was a gradual deterioration of the entire state water development system due to a number of causes including advancing age, poor initial construction practices for some projects, the inability of water users associations to finance major repairs for their projects, increasing costs per employee of state government, and decreased availability of general fund monies to plan and accomplish repairs and improvements. To a considerable extent, the state yielded its responsibilities regarding water projects to the federal government, which has been active during the 1950's, 1960's and early 1970's in the construction of water projects. In many cases, repairs to state-owned water projects were undertaken only on the availability of federal funding. The sporadically depressed condition of the agricultural economy of the state further discouraged construction of new water projects and provided little incentive for individual farmers and ranchers and the water users associations to pay increased water costs to existing projects, so that the additional proceeds needed for an effective and aggressive maintenance program were simply not available. Indeed, a few projects had long-term contracts (in one case with a perpetual term) which did not recognize the need for escalation of assessments to offset both inflationary pressures and the increasing costs of maintenance due to the advancing age of the project.

In 1967 the State Water Conservation Board was replaced by the Montana Water Resources Board, responsible for the management of the state water







projects as well as other activities, including water planning and water rights surveys. When executive reorganization of state government occurred in 1971, the Montana Water Resources Board was replaced by the Water Resources Division of the Department of Natural Resources and Conservation.

During the 45th legislative session in early 1977, the Department of Natural Resources and Conservation advised the Legislature through various committees that the Department had inadequate funds to effectively maintain the existing state water projects and that, because of physical degradation of the projects, the state could incur a large liability in the event of either catastrophic failure of a major dam or destructive flooding of agriculture lands from leaking canals owned by the state. The Department advised the Legislature that it would seek sources of funding from the federal government and other sources available to rectify this situation and would return to the next session of the Legislature with a comprehensive plan endorsed by the Board of Natural Resources and Conservation for either putting the state effectively in or taking it completely out of the water resources development business.

In March of 1977, the Department delivered to each member of the Legislature a publication entitled State Water Conservation Projects (Montana Department of Natural Resources and Conservation, Helena, 1977) which essentially was a status report on the physical characteristics, present condition, and economic situation of 35 major state-owned water projects and a number of projects of smaller size and/or no longer active. A master list of existing projects was also supplied in this report, as was a general indication of the Department's intention regarding retention of a number of the smaller projects.

In March 1978 the Board of Natural Resources and Conservation adopted the "Conceptual Plan for Montana Water Resources Projects". The crucial element in the plan is the hydroelectrification of state-owned dams and



subsequent sale through long-term contracts of the electricity generated. The revenue thus derived would enable the state to satisfactorily repair and maintain existing projects and to construct new water resources projects. Additionally, implementation of the plan could aid in reduction of unemployment within the state, assist in alleviation of electrical energy shortages, provide further support to the agricultural community, and put the state of Montana back into the business of water resources development and maintenance on a financially, economically, and environmentally sound basis. Since that time the Water Resources Division has prepared feasibility studies on that electrification of three state-owned dams and now employs a full-time hydropower engineer to implement that part of the Conceptual Plan.

#### A MAJOR DAM PROBLEM

Congress recently passed a National Dam Safety Act (PL 92-367) in response to the failure of the Kelly Barnes Dam in Georgia. Subsequently, the Corps of Engineers inspected or funded the inspection of dams throughout the United States. The program in Montana will be completed by October 1981. To date, dam inspections have revealed that 16 state-owned are unsafe, primarily because undersized spillways. That is, the spillway of each state-owned dam is too small to pass the probable maximum flood (PMF) which could occur in the drainage basin of the dam. In the event of a PMF each dam could overtop, resulting in downstream loss of life and property damage. The following table presents a list of unsafe state dams, project characteristics, and the percentage of the PMF which the respective project can safely pass.



## STATE-OWNED DAMS

| <u>DAM</u>      | <u>HEIGHT</u> | <u>STORAGE</u> <u>CAPACITY</u> | <u>PMF Routed</u> |
|-----------------|---------------|--------------------------------|-------------------|
| Cooney          | 97            | 24,195                         | 30%               |
| Tongue River    | 91            | 69,439                         | Unknown           |
| Deadman's Basin | 63            | 76,900                         | Unknown           |
| Martinsdale, E  | 44            |                                |                   |
| Martinsdale, N  | 86            | 23,105 Total                   | 75%               |
| Bair            | 97            | 7,029                          | Unknown           |
| Ruby            | 111           | 38,850                         | 11%               |
| Cataract Creek  | 77            | 1,478                          | 27%               |
| Willow Creek    | 105           | 18,000                         | 12%               |
| Middle Creek    | 106           | 7,780                          | 29%               |
| Rock Creek      | 83            | 16,040                         | 43%               |
| Fred Burr       | 50            | 516                            | Unknown           |
| Painted Rocks   | 143           | 32,302                         | 45%               |
| Yellow Water    | 37            | 4,242                          | 10%               |
| Petrolia        | 52            | 9,102                          | 4%                |
| Nevada Creek    | 75            | 12,640                         | 19%               |
| Glacier Lake, N | 37            |                                |                   |
| Glacier Lake, S | 20            | 4,200 Total                    | Unknown           |



The design criteria for dams has changed substantially since the 30's and 40's because of the dam failures which have occurred throughout the world. State-of-the-art criteria now required that spillways of dams be designed to pass the probable maximum flood. While the design of state-owned dams was adequate then, the dams are recognized today as unsafe. It's like a '39 Buick; it was a fine car in those days, but it wouldn't meet the performance standards of today. Because these dams are classified as high hazard, (i.e., dam failure could cause loss of life) the State's basic alternatives are clear: 1) Rehabilitate the spillways of state-owned dams, 2) Breach the dams, or 3) do nothing. The degree of the problem of unsafe dams cannot be quantified with a great deal of accuracy so this discussion of how to make state-owned dams safe will of necessity be general. The options available to the state and their respective disadvantages and advantages will be identified. It is important to consider alternative courses of action and their implications before the state is placed in a crisis situation regarding the safety of any state project. The general policy implications of each alternative should be identified and discussed so guidelines can be formulated to govern specific projects. The following discussion presents general policy considerations of the options open to the state regarding spillway rehabilitation of state-owned dams.

#### Option 1: Rehabilitation of Spillways

Rehabilitation of the spillways of state-owned dams will cost over \$100 million at today's prices. The most expensive project to rehabilitate is the Tongue River Dam which will be around \$80,000,000. The cheapest to rehabilitate will average about \$500,000. The following basic steps are necessary to make each dam safe - - none of them are free.

- Develop emergency operating plan





- Develop standard operating plan
- Refine probable maximum flood estimate
- Prepare flood-damage routing
- Complete engineering design studies
- Procure project financing
- Construct new spillway

Financing state dam rehabilitation is a challenge because no single source of revenue can be identified which will pay for the total cost. None of the state projects can be totally self supporting. There are five ways spillway rehabilitation can be financed: User payments, general fund appropriations, hydropower revenues, federal grants and loans, and development of unique project benefits. Financing spillway rehabilitation should be evaluated on a project by project basis to determine the best method or combination of methods.

#### USER PAYMENTS

In all cases it is doubtful that the persons who benefit directly from a state-owned reservoir could pay for rehabilitation of the spillway. The major marketable benefit from state dams is irrigation water, and the existence of or potential to develop an industrial market for water is limited in most instances. In most cases, irrigators cannot afford to pay the cost of spillway rehabilitation to maintain existing water supplies. For instance, Tongue River water users pay about \$1.65 per acre-foot for water. In order for irrigation sales to pay the cost of spillway rehabilitation, ranchers would have to pay over \$100 per acre-foot for water from a rehabilitated Tongue Dam.

In some cases, sale of additional water to irrigators could contribute to financing spillway rehabilitation. The Cooney Dam spillway will be enlarged and at the same time the dam will be raised. The enlarged project will result in an increase of 4,200 acre-feet of storage; and additional



water contracts can be sold for 4,000 af at an estimated rate of \$2.53 per acre-foot. The additional water sales can only supplement other revenues to pay the total cost of spillway rehabilitation of \$2,278,300.

Most projects cannot market additional water to help fund rehabilitation costs. Achley Lake has excess unsold capacity. Water is available from Painted Rocks Reservoir but is rarely purchased.

Industrial markets for water from state dams are limited with little potential to develop. The location of some projects is too far removed from any likely market. Furthermore, interest groups and local residents may oppose state policy which actively seeks to develop an industrial market for water, particularly if supplying the water would encourage the development of synthetic fuel plants.

State-owned dams are multipurpose and provide recreation and flood control in addition to marketable water. Capturing repayment from persons who benefit from recreation and flood control is not easy. There is no established market or price for a "unit" of flood control or recreation. Imagine the administrative difficulties of financing each state-owned dam and charging recreators admission to the reservoir in order to capture repayment of recreation benefits. In some states, such as Colorado, special districts can be established to construct, own, and operate dams. The districts are given authority to levy property taxes in order to receive compensation for benefits provided by a reservoir. If a reservoir provides the safety necessary to allow persons to inhabit a flood plain property values are increased. Property taxation could help capture area-based public benefits provided by a reservoir. Portions of spillway rehabilitation that are secured by user payments can be financed with revenue bonds. The bonding authority granted to the State Water Conservation Board, predecessor of the Board of Natural Resources and Conservation, is still intact. However,



the interest rate ceiling of 6% would have to be changed to allow the bonds to carry a higher rate of interest if a water project revenue bond were to be sold in today's market. Currently the State of Montana has a AAA credit rating which is the highest rating given in the municipal bond market. If the Department of Natural Resources and Conservation chose to finance project rehabilitation with revenue bonds care would have to be taken to insure sound project financing so that the state's credit rating would not be jeopardized. If rehabilitation revenue bonds were to be defaulted, the state might be forced to repay the bond principal and interest from the general fund in order to maintain its excellent credit and accompanying interest rate and advantages.

Revenues from water sales will not cover the full cost of spillway rehabilitation for any state project. Some projects are more self-supporting than others, however, all will require a supplemental source of revenue in order to pay for rehabilitation to allow the project to be made safe and to continue benefits provided by the project.

#### FINANCING PROJECT REHABILITATION WITH GENERAL FUND REVENUES

The decision to finance part of the cost of spillway rehabilitation by taxing Montana citizens is one which is made by the state legislature. Historically general fund appropriations have been insufficient to provide the needed revenue for most projects. However, the general fund might be adequate to supplement user payments on projects with rehabilitation costs of from \$500,000 to \$1,500,000. Funds for state projects have also come from the Resource Indemnity Trust Fund and Renewable Resource Development Fund.

If general funds are used to rehabilitate state dams then the general taxpayer is providing a subsidy to persons who pay less than the cost of providing irrigation water, recreation, and flood control. However, if





taxpayers believe that an agricultural economy contributes to the quality of life in Montana and that the provision of scattered recreation is an important benefit, then the taxes paid to support rehabilitation of state-owned dams represent the value of those benefits to a taxpayer.

#### PAYMENT FOR SPILLWAY REHABILITATION WITH HYDRO ELECTRIC REVENUES

The Conceptual Plan called for installation of hydroelectric generation capability on state-owned projects. The revenues from hydroelectricity generated from the state projects would help support spillway rehabilitation and could make funds available to repair existing state projects or build new ones.

Pricing the electricity generated by state-owned dams is a policy issue. The Department recommended in the Conceptual Plan For Montana Water Resources Projects, 1978, " . . . a rate structure sufficient to make a return to the state of approximately \$1,000,000 per year in addition to debt-amortization and O&M expenses. This magnitude of profit is considered necessary to get on with the business of upgrading and rehabilitating other state water projects." Some citizens, however, believe that the state developed power should be priced closer to the cost of providing it. Electricity users would be financing rehabilitation of reservoirs in other parts of the state from which they receive no direct benefit.

Apart from the issue of pricing electrical power generated at state-owned dams, the amount of revenue available from hydroelectrification of state projects may not be available soon enough and in large enough quantities to finance needed safety repairs to state dams. The Tudor Engineering Company performed the study describing the feasibility of the hydroelectrification of state-owned dams and of the marketability of the power. The study identifies hydroelectrification of an initial three state



projects in Montana--Broadwater-Missouri at Toston, Painted Rocks on the West Fork of the Bitterroot River, and Deadman's Basin on the Musselshell. Both the Vigilante Electric Cooperative and the Department have filed preliminary permits with the Federal Energy Regulatory Commission (FERC) to develop hydroelectric capability at Toston Dam. FERC will make a final ruling between the two applications within three months. Toston Dam could provide three-quarters of the one million dollar return from hydroelectrification of the first three state projects, so it is an important increment.

The plan to install hydroelectric capability on state dams is at least two years behind schedule. Until the controversy is resolved regarding who will develop Toston Dam, revenue from hydroelectrification of state dams is uncertain. Even if all three proposed units are developed and electricity sales return one million dollars, the timing of those revenues may be prohibitive. A decision as to which projects are in most urgent need of repair will not be made until the Corps' safety inspections are complete and can be evaluated. It may be that the least costly projects are not those that must be rehabilitated first. In that case the electricity revenues would provide only a supplemental source of funding for repair of state dams.

#### FUNDING SPILLWAY REHABILITATION WITH FEDERAL FUNDS

The state receives regular assistance in project rehabilitation from the federal government. Generally federal funds have been used to fund up to 50% of the cost of rehabilitation of projects with costs around \$2,000,000. Federal money is not so easily obtained in financing a project as costly as the Tongue River Dam.

Federal funds are available from such agencies as the Soil Conservation Service (SCS) and the Water and Power Resource Services (WPRS). The state also receives technical help from federal agencies such as the Corps of



Engineers, SCS, and WPRS.

Federal funds will be utilized whenever possible, however, federal money is not a reliable source. Federal laws and programs can change substantially in a short time effectively eliminating some aid available to states. For instance, the application for a loan to rehabilitate Cooney Dam was submitted under PL 84-984 administered by WPRS. This year the law was changed and new construction was barred under PL 84-984; consequently, the Department is pursuing special legislation to get Cooney Dam rehabilitation financed under that law.

#### FINANCING SPILLWAY REHABILITATION USING UNIQUE PROJECT ASSETS

State projects often have unique assets which can be exploited to pay for spillway rehabilitation. The Department is exploring the possibility of mining coal beneath the Tongue River Reservoir as a means of financing a new spillway for the Tongue River Dam. Ranch buildings which are of the Nevada Creek project are being renovated so that they may be leased. Income would go to the general fund, but could be earmarked for project rehabilitation, if new legislation is passed.

Site specific analysis of state-owned projects should address unique project assets which have income producing potential. Development of any such unique project assets which have income producing potential. However, most project assets other than water sales revenue and potential hydro-power generation will not support a significant portion of the cost of project rehabilitation.

#### SUMMARY

No single source of revenue will cover the cost of project rehabilitation. Projects cannot be self-supporting unless user payments are supplemented by other marketable project assets. Often more than two sources of revenue



must be identified to pay the costs of project rehabilitation. The total costs and the timing of rehabilitation will become less fuzzy when the Corps' safety inspections of all state dams are available.

If the state decides that projects should be made safe, an alternative exists to rehabilitation. The state could decide to breach or physically remove parts of a project in order to make it safe.

#### Option 2: Breaching Unsafe State Projects

If a state project is highly uneconomical and/or if the benefits from a project are insignificant, the state has the option of breaching a project in order to make it safe. There are several costs if a project is breached. The most visible cost of breaching a project is the construction cost to remove it or alter it sufficiently to make it safe. That cost would probably be born by the taxpayers of Montana. The cost to breach the Tongue Project is about \$10,000,000. The cost to breach any other state project would probably be substantially less than that but no specific breach analysis has been performed on other projects.

The second, less visible yet possible greater cost of breaching a project would result from the loss of benefits provided by the project breached. Almost 100,000 acres of land are irrigated under existing state projects that have dams associated with them. If a project is breached, agricultural production would decline. Income to farmers and ranchers would also fall; however, it is difficult to forecast the extent to the decline without knowing what type of farming is affected. Not only are farmers and ranchers directly and possibly severely impacted by decreased agricultural production, but the tax base of Montana will also decline. Without more data and technical information on specific projects it is difficult to know the magnitude of the impact that discontinuation of





water supplied by state projects would have on agriculture in Montana.

Recreation and flood control benefits provided by a state project would also be foregone if that project were breached. No studies have been completed to quantify what flood damage could result if state projects were removed. Recreational benefits of state projects have not been evaluated although many state projects receive heavy recreational use. Such projects as Tongue River and Cooney are quite popular for summer recreation.

Breaching a state project would reduce agricultural and public benefits and the state would also lose its investment in the project. Total investment in state dams is \$5,026,511.57. However, if costs of rehabilitation significantly outweigh the benefits of a state dam, breaching the dam might be considered. Each project must be specifically evaluated to determine if breaching is a reasonable alternative. The Department, Board and possibly the legislature would all be involved in such a decision.

Breaching state-owned dams might be constrained on several counts. The environmental impacts of breaching could be prohibitive. For instance the Tongue River Reservoir has accumulated a great deal of sediment. Breaching the dam has possible severe environmental impacts which need to be assessed before breaching could be completed. Another consideration might be the political reaction to breaching a dam. Local citizens and/or other interest groups could become concerned and effectively lobby for a legislative decision to provide funding for project rehabilitation.

#### SUMMARY

Breaching or largely dismantling state projects will require a full analysis to determine the extent of the costs of breaching a state project. Project costs such as construction, decline in agricultural output, and decrease state income may or may not be offset by any state or federal support necessary to fund the project rehabilitation costs. Environmental



effects and political reactions may be effective constraints to breaching projects.

### Option 3: Take No Action

The state has a final option in that it may decide to do nothing. Preservation of the status quo is possible if the state decides that it will do nothing to make state-owned dams safe for the long run."

While the do-nothing option appears essentially costless, it is not. Although no money is spent on repair and rehabilitation, the risk of a dam failure increases as time passes. Taking no action to rectify the problem could impose significant social and economic costs. If a state dam were to overtop during a large storm, persons could be killed and extensive damage to private property could also result. The state would be liable in the event of a dam failure. The extent of possible state liability is a legal issue which would be addressed after the catastrophe -- it is anticipated that state liability would be complete and large.

### PROJECT SPECIFIC ANALYSIS

Project specific analysis are needed in order to determine the costs, revenues, and benefits of each state-owned dam. Each project is unique. It is difficult to make valid generalizations about the safety of projects, the cost of repair projects, and the revenues available. While the Water Resources Division will attempt to study each dam, adequate budget and personnel have not been made available in order to accomplish that task.

It seems logical that the most hazardous dams should be rehabilitated first. It would also seem appropriate that general guidelines be developed to address such issues as funding of rehabilitation.



SUMMARY

The state owns and is responsible for 23 dams, each of which are unsafe. Each of the spillways of state dams is too small to handle large storms and must be rehabilitated or breached in order to be made safe.

The state is constrained by inadequate information regarding the probable maximum flood, and specific rehabilitation costs for each state project. The state is further constrained by a limited budget and possibly short time frame in which to make projects safe.

There are a few certainties about the problem of rehabilitating state dams, however. No single source of revenue which can be identified at this time will provide a sure, reliable source of funding for the entire cost of a single project's rehabilitation. Water sales revenue is generally limited to agricultural users who cannot pay high price of rehabilitation. The development of new agricultural, municipal and industrial water markets for state projects is limited. Sources of federal and state tax revenues are limited - particularly in considering the more expensive rehabilitation costs. Hydro-power revenues, while potentially attractive, are uncertain at this time and may not flow in sufficient quantities at the necessary times in order to finance a large block of spillway rehabilitation costs. Development of other income producing project assets may not prove to be a significant source of revenue. Combinations of funding sources must be used to finance project rehabilitation.







